

angioplasty alone) based on correction of malapposition and under-expansion being performed first, while repeat stenting was reserved for cases with significant intrastent tissue proliferation. Both the angiogram and the pre-intervention OCT were analyzed separately by the core lab team. For each case, the core lab would assign a virtual treatment approach based on the angiogram alone or based on the OCT alone.

RESULTS 70 cases of late stent thrombosis were analyzed. Based on OCT, intrastent thrombus was identified in all the cases. Excessive tissue proliferation was noted in 27 patients, uncovered/malapposed struts in 27 patients, both findings in 14 patients, and no clear culprit in 2 patients. By angiography, excessive tissue proliferation was noted in 37 patients, uncovered/malapposed struts in 19 patients, and no clear culprit in 14 patients. There was poor agreement between OCT and angiography ($\kappa=0.11$, $p=0.11$). Based on the proposed algorithm, the virtual treatment strategy was changed by OCT relative to angiography guidance in 32.8% of the cases, with repeat stenting advocated for only 51% of the cases.

CONCLUSIONS OCT can effectively identify multiple intra-stent pathologies in late stent thrombosis. Information obtained from OCT can substantially change how PCI is performed when a predefined treatment algorithm is followed.

CATEGORIES IMAGING: Intravascular

KEYWORDS OCT, Stent thrombosis, late

TCT-47

Comparative Optical Coherent Tomographic analysis of in-stent neoatherosclerosis between 1st and 2nd generation drug-eluting stent

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BACKGROUND Although in-stent neoatherosclerosis contributes to late failure of bare metal and first generation drug eluting stent (DES), there is lack of data on new, 2nd generation DES. The aim of this study was to compare the characteristics of in-stent neoatherosclerosis of 2nd generation DES and 1st generation DES using optical coherence tomography (OCT).

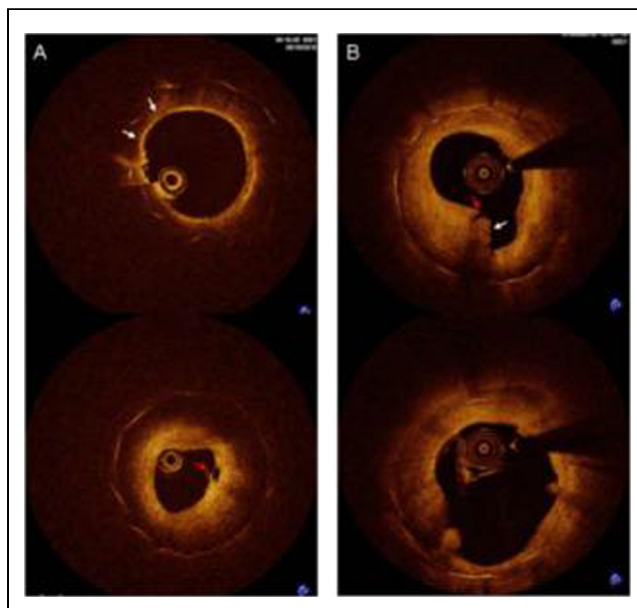
METHODS Pre-procedural OCT and grayscale intravascular ultrasound were analyzed in 86 patients (58 stable angina, 28 acute coronary syndrome) who underwent clinically-driven target lesion revascularization (TLR) within the 4 years after DES placement. 1st generation DES group was composed of 16 sirolimus-eluting stents and 35 paclitaxel-eluting stents; and 2nd generation DES was composed of 21 everolimus-eluting stents, 9 zotarolimus-eluting stents, and 2 novolimus-eluting stents.

RESULTS The median duration for target lesion failure were 11.2 months (IQR 5.7-23.6 months) in 1st generation DES and 8.9 months (IQR 6.1-15.9 months) in 2nd generation DES ($p=0.222$). In both generations, focal stenosis was the predominant type of angiographic restenosis. Overall, 1st generation DES had more frequent OCT-defined in-stent thin-cap fibroatheroma (TCFA)-containing neointimal lesions than 2nd generation DES (33.3% vs 12.5%, $p=0.032$) and the significance was mainly developed after 12 months of DES implantation (TLR <12 months after implantation, 15.0% vs 18.2%, $p=0.818$, DES ≥ 12 months after implantation, 44.1% vs 9.5%, $p=0.007$). Otherwise there were no differences in other of unstable neointimal morphology such as the frequency of rupture (42.6% vs. 25.0%, $p=0.100$), thrombi (46.3% vs. 46.9%, $p=0.421$) or microvessel (55.6% vs. 53.1%, $p=0.827$).

CONCLUSIONS The OCT morphological characteristics of in-stent neoatherosclerosis between generations of DES were similar. But 2nd generation DES demonstrated lesser OCT-detected TCFA than 1st generation DES, especially after 12 months of implantation.

Table 3. OCT findings of in-stent restenosis between generations of DES

	1st generation (n=54)	2nd generation (n=32)	p
TCFA	18 (33.3%)	4 (12.5%)	0.032
Lipidic neointima	50 (92.6%)	27 (87.1%)	0.404
Calcific neointima	6 (11.1%)	3 (9.4%)	0.799
Thrombi	25 (46.3%)	15 (46.9%)	0.421
Rupture	23 (42.6%)	8 (25.0%)	0.100
Microvessel	30 (55.6%)	17 (53.1%)	0.827
TCFA or Rupture	30 (55.6%)	8 (25.0%)	0.006
ISR pattern			0.104
Homogenous	20 (37.0%)	12 (48%)	
Heterogenous	26 (48.1%)	6 (24.0%)	
Layered	8 (14.8%)	7 (28.0%)	



CATEGORIES IMAGING: Intravascular

KEYWORDS DES, Neoatherosclerosis, OCT

TCT-48

Early vascular responses to everolimus-eluting cobalt-chromium stent for the treatment of stable coronary artery disease: The results of MECHANISM-Elective 1-month OCT follow-up cohort

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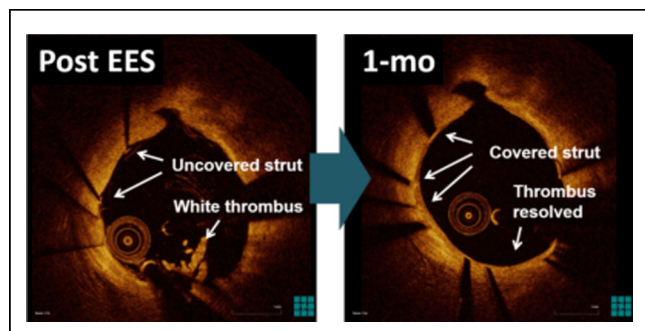
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BACKGROUND Several clinical trials have indicated the advantage of everolimus-eluting cobalt chromium stents (EES) for the treatment of stable coronary artery disease (CAD), proposing its safety profile so as to shorten the duration of dual anti-platelet (DAPT) up to three months. However, the early vascular reactions during this period and underlying mechanisms remains unclear.

METHODS The MECHANISM Elective study is a multi-center registry designed to elucidate early vascular responses to EES for stable CAD patients using optical coherence tomography (OCT). Patients received OCT examination immediately after EES implantation (post EES) and were prospectively registered in either 1-month (1-mo) or 3-month scheduled OCT follow-up cohort. Among them, 1-mo cohort had been completed and images were independently analyzed. In addition to standard OCT parameters, incidence of intra-stent thrombus (IS-Th) and % length of IS-Th (the numbers of cross-section with IS-Th \times 100 divided by total number of cross-sections within the stented segment) were assessed.

RESULTS Among a total of 51 patients (Age: 70 ± 11 years, Male: 69%) enrolled in 1-mo cohort from 20 sites, 49 patients (52 EESs) were available for complete serial OCT analysis. Average stent length and area were 27.9 ± 12.4 mm and 6.5 ± 2.0 mm². Robust neointimal coverage was observed at 1-mo. Both % uncovered and % malapposed strut significantly decreased at 1-mo compared to post EES (Table, representative image in Figure). The incidence and the length of IS-Th significantly decreased at 1-mo. Most of intra-stent and edge dissections was resolved (Table).

49 case (52 stents)	Post EES	1-mo	P value
Lumen area (mm ²)	6.7 ± 2.1	6.6 ± 2.1	0.09
Thickness of neointima (μ m)		28 ± 13	
Area of neointima (mm ²)		0.056 ± 0.31	
% Uncovered strut (%)	86.3 ± 9.9	6.4 ± 10.2	<0.001
% Mal apposed strut (%)	7.5 ± 6.0	2.9 ± 3.6	<0.001
Intra-stent dissection (n (%))	40 (76.89%)	9 (17.3 %)	<0.001
Proximal edge dissection (n (%))	10 (19.2%)	4 (7.7%)	0.0017
Distal edge dissection (n (%))	7 (13.4%)	3 (5.8%)	0.017
Incidence of IS-Th (n (%))	33 (63.5%)	17 (32.7 %)	<0.001
% Length of IS-Th (%)	7.4 ± 10.9	2.5 ± 4.9	0.001
(IS-Th; Intra-stent thrombus)			



CONCLUSIONS MECHANISM Elective study 1-mo cohort firstly revealed the early vascular reactions following EES implantation in Stable CAD patients. Considering dynamic resolution of IS-Th and dissections with the rapid decrease in uncovered and malapposed strut at this early phase, EES may have a potential to shorten the DAPT duration up to 1 month in this patient subset.

CATEGORIES IMAGING: Intravascular

KEYWORDS Drug-eluting stent, everolimus, Drug-eluting stent, second generation, Imaging

TCT-49

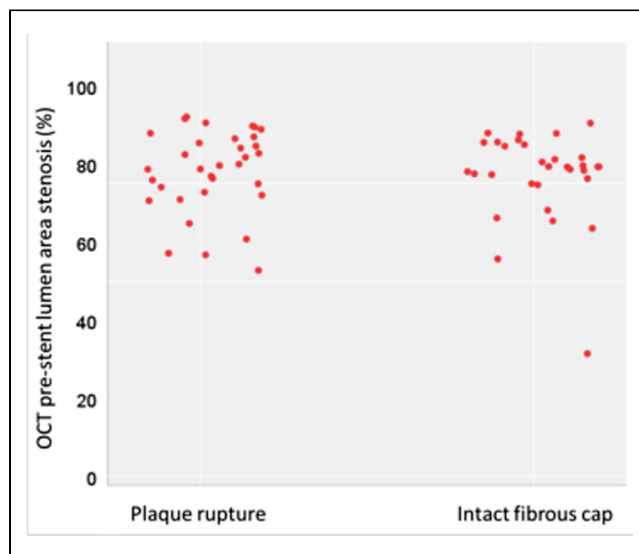
Underlying stenosis severity is independent of culprit plaque morphology in STEMI – an optical coherence tomography study

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BACKGROUND Prior data has suggested that patients with STEMI without a ruptured plaque (intact fibrous cap, IFC) have mild stenoses after thrombectomy and therefore may be managed without stenting. This finding needs to be validated in a larger prospective study. In the present study, we compared angiographic and imaging findings between IFC and plaque rupture (PR) culprit lesions in patients with STEMI undergoing primary PCI.

METHODS We studied patients in an OCT substudy of the TOTAL (Thrombectomy versus PCI ALone) trial who were randomly assigned to aspiration thrombectomy (n=93). Culprit plaque morphology, quantitative lesion parameters, plaque composition (at 1mm intervals), and fibrous cap thickness were measured by an independent OCT core laboratory.

RESULTS Of the 93 patients with OCT imaging following thrombectomy, culprit lesion morphology was assessable in 70 (75.3%) patients. The culprit lesion morphology was IFC in 31 (44.3%) patients, PR in 34 (48.6%) patients, and calcified nodule in 5 (7.1%) patients. By quantitative coronary angiography, pre-procedure reference vessel diameter was smaller in IFC (2.7 ± 0.6 mm) vs. PR (3.1 ± 0.8 mm) ($p = 0.042$), while diameter stenosis was not different (92.5 ± 11.2 vs 90.9 ± 11.1 in IFC vs PR) ($p = 0.61$). Following thrombectomy, OCT demonstrated that IFC had smaller reference vessel area, but similar lumen area stenosis (75.9% vs 77.4%, IFC vs PR) ($p=0.64$) (Figure) and lumen diameter stenosis (51.8% vs 53.5%, IFC vs PR) ($p=0.59$). Lumen area stenosis <50% was observed in none of the patients with PR and in 1 patient with IFC. IFC had fewer quadrants with lipid plaque (28.16 ± 15.02 vs 39.12 ± 14.23 , IFC vs PR), ($p = 0.004$) and thicker fibrous cap (91.03 ± 16.97 vs 62.05 ± 9.13 , IFC vs PR) ($p<0.001$) as compared to PR.



CONCLUSIONS IFC lesions had smaller reference vessel dimensions, however, pre-procedure and post-thrombectomy stenosis severity was similar. Mild stenoses were uncommon suggesting that the in vivo diagnosis of IFC may not alter management in most patients with STEMI.

CATEGORIES IMAGING: Intravascular

KEYWORDS OCT, Plaque erosion, ST elevation myocardial infarction